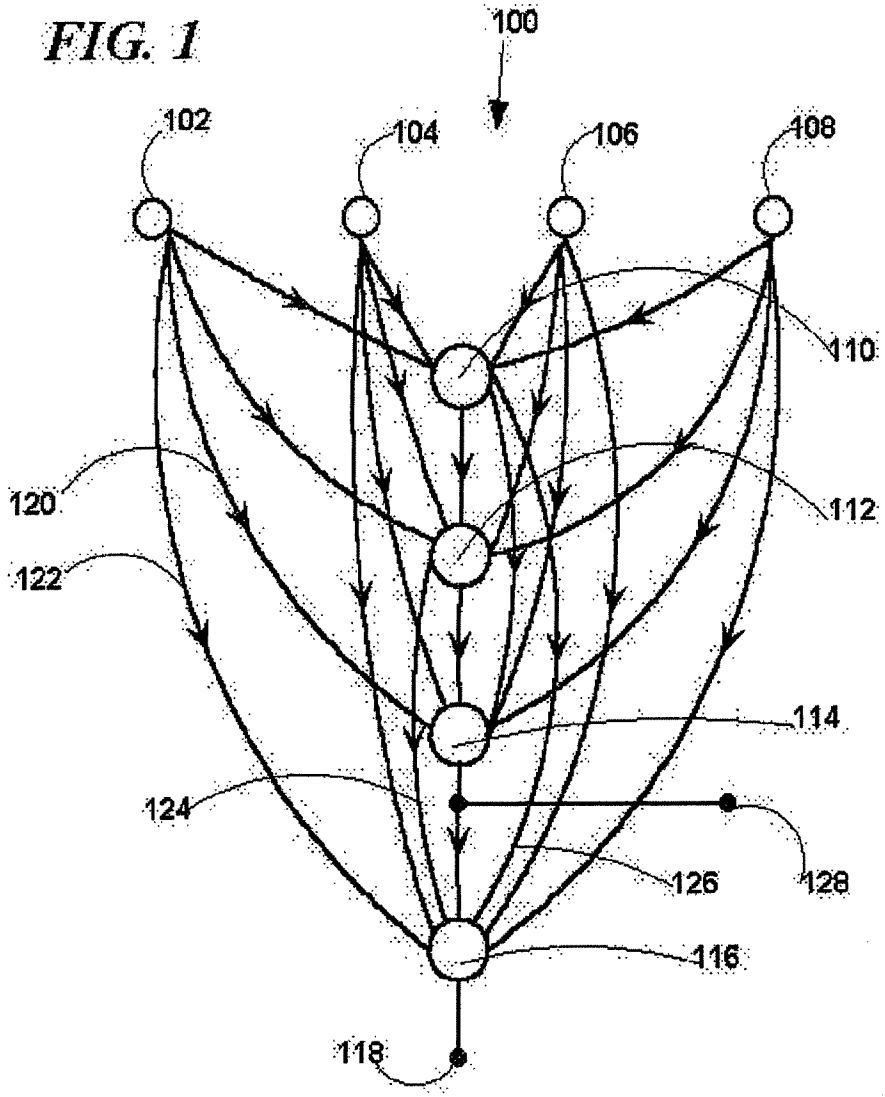
FIG. 1


100
102
104
106
108
110
112
114
116
118
120
122
124
126
128

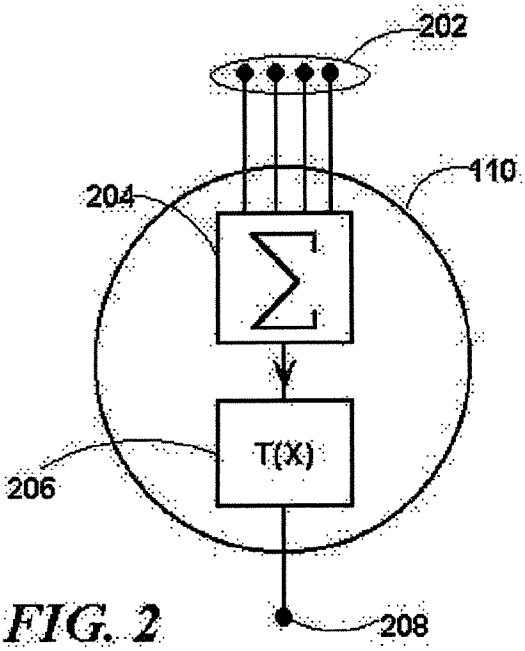

202
110
204
T(X)
206
208

FIG. 2

FIG. 3

300

302

	X_0	X_1	X_2	...	X_n	h_1	h_2	...	h_{m-1}
H_1	W_{10}	W_{11}	W_{12}	...	W_{1n}	0	0		0
H_2	W_{20}	W_{21}	W_{22}	...	W_{2n}	V_{21}	0		0
H_3	W_{30}	W_{31}	W_{32}	...	W_{3n}	V_{31}	V_{32}		0
...	...	...	...	...	...	...	...	...	
H_m	W_{m0}	W_{m1}	W_{m2}	...	W_{mn}	V_{m1}	V_{m2}	...	$V_{m,m-1}$

FIG. 5

506

502

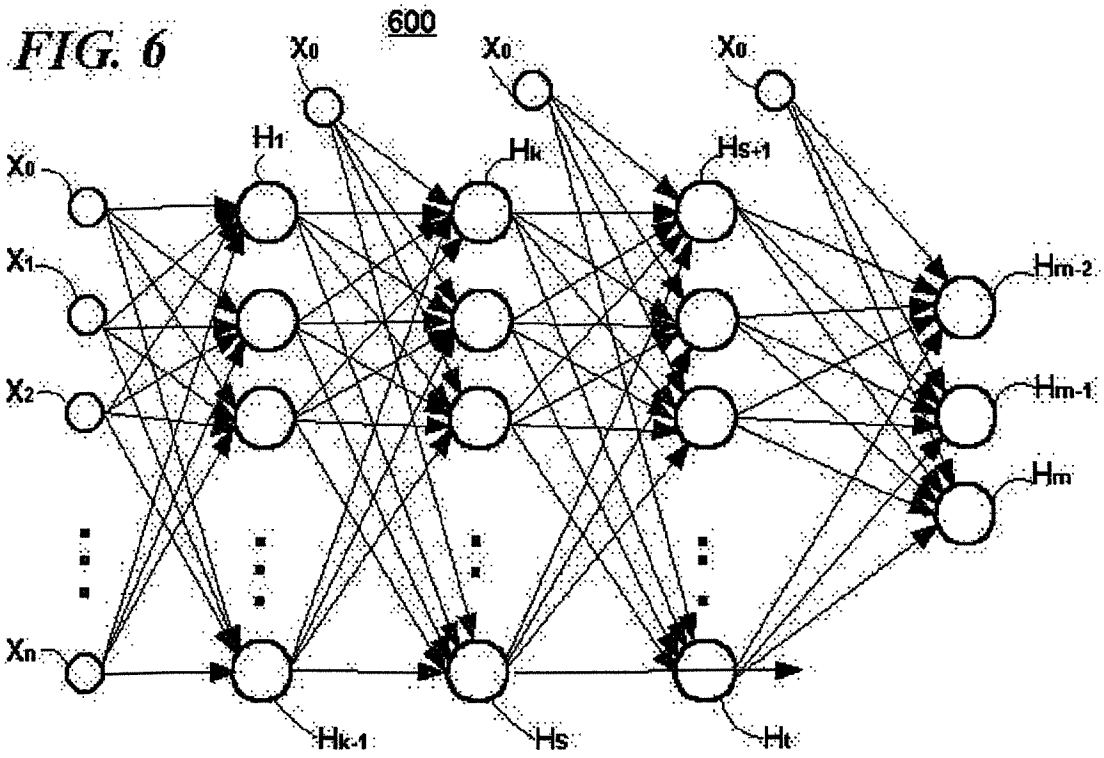
500

504

508

510

FIG. 6



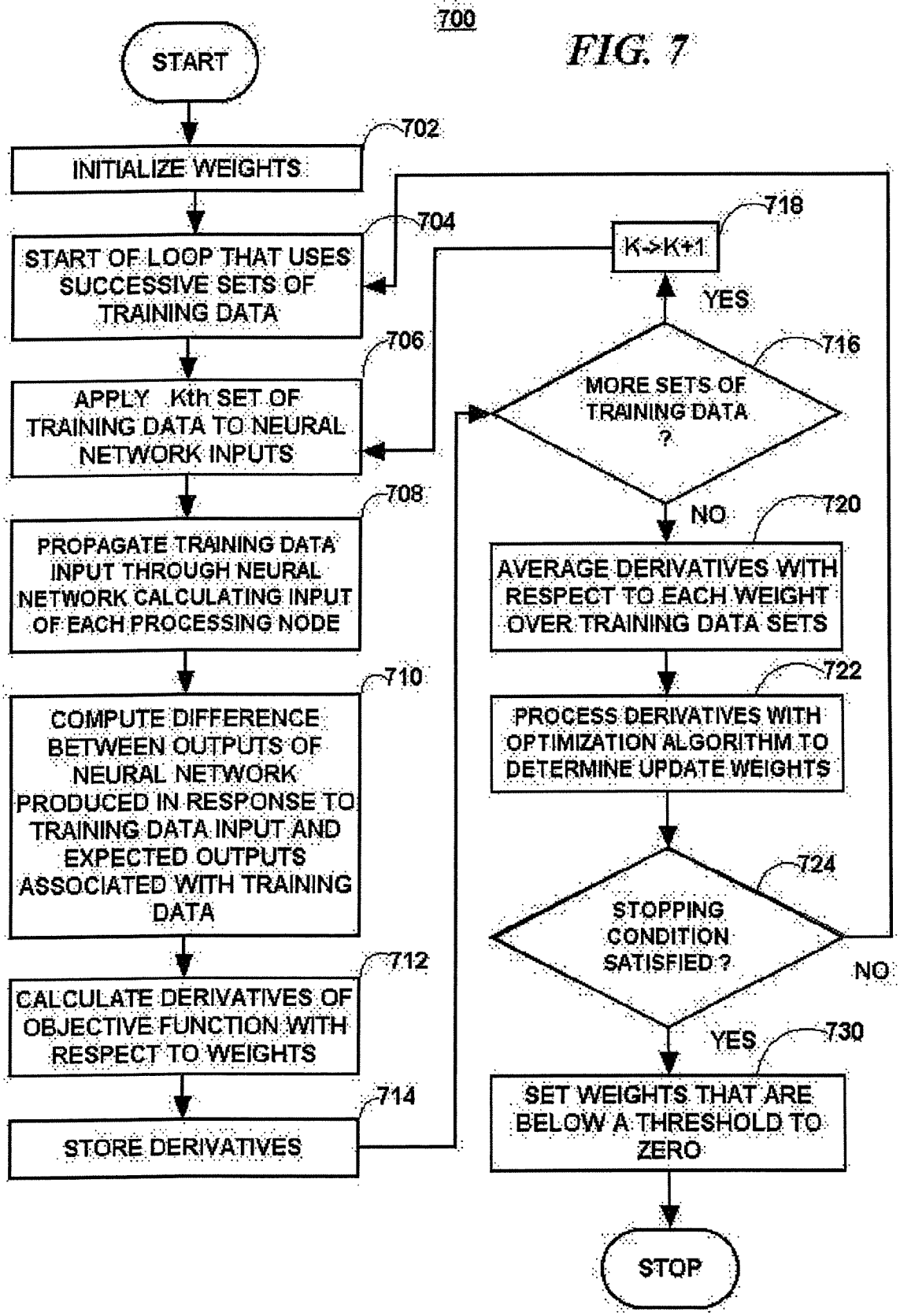

700
START
INITIALIZE WEIGHTS
702
START OF LOOP THAT USES SUCCESSIVE SETS OF TRAINING DATA
704
APPLY Kth SET OF TRAINING DATA TO NEURAL NETWORK INPUTS
706
PROPAGATE TRAINING DATA INPUT THROUGH NEURAL NETWORK CALCULATING INPUT OF EACH PROCESSING NODE
708
COMPUTE DIFFERENCE BETWEEN OUTPUTS OF NEURAL NETWORK PRODUCED IN RESPONSE TO TRAINING DATA INPUT AND EXPECTED OUTPUTS ASSOCIATED WITH TRAINING DATA
710
CALCULATE DERIVATIVES OF OBJECTIVE FUNCTION WITH RESPECT TO WEIGHTS
712
STORE DERIVATIVES
714
MORE SETS OF TRAINING DATA ?
716
YES
K->K+1
718
NO
AVERAGE DERIVATIVES WITH RESPECT TO EACH WEIGHT OVER TRAINING DATA SETS
720
PROCESS DERIVATIVES WITH OPTIMIZATION ALGORITHM TO DETERMINE UPDATE WEIGHTS
722
STOPPING CONDITION SATISFIED ?
724
NO
YES
SET WEIGHTS THAT ARE BELOW A THRESHOLD TO ZERO
730
STOP

FIG. 7

FIG. 8

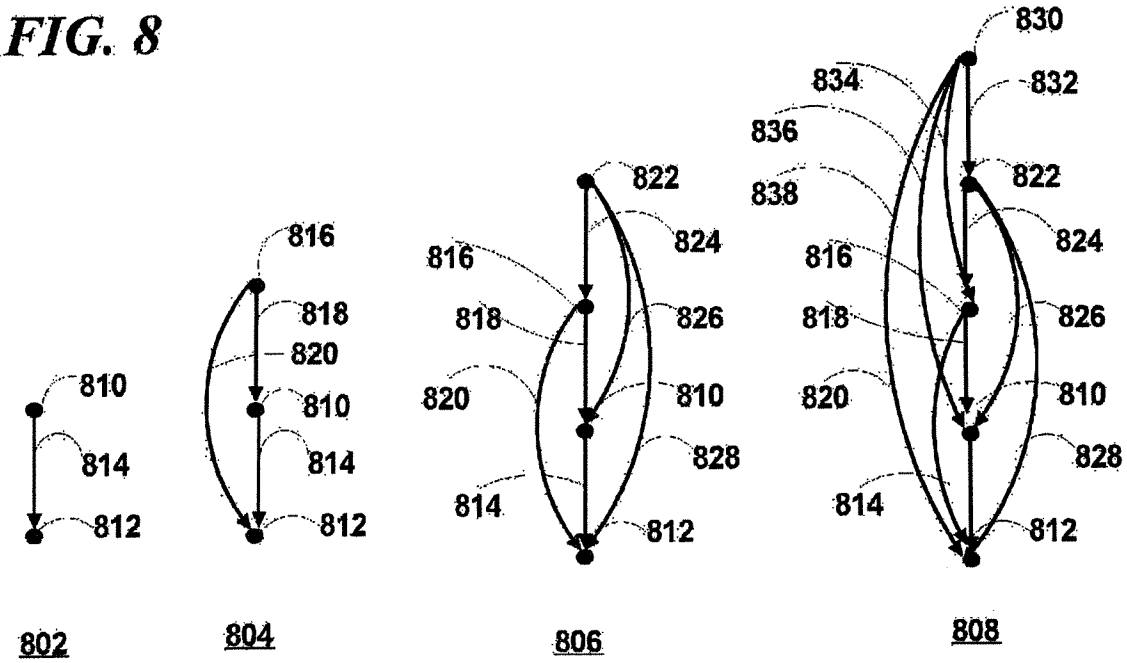

810
814
812
816
818
820
810
814
812
822
824
816
818
826
820
810
828
814
812
830
834
832
836
822
838
824
816
826
818
810
820
828
814
812
802
804
806
808

FIG. 9

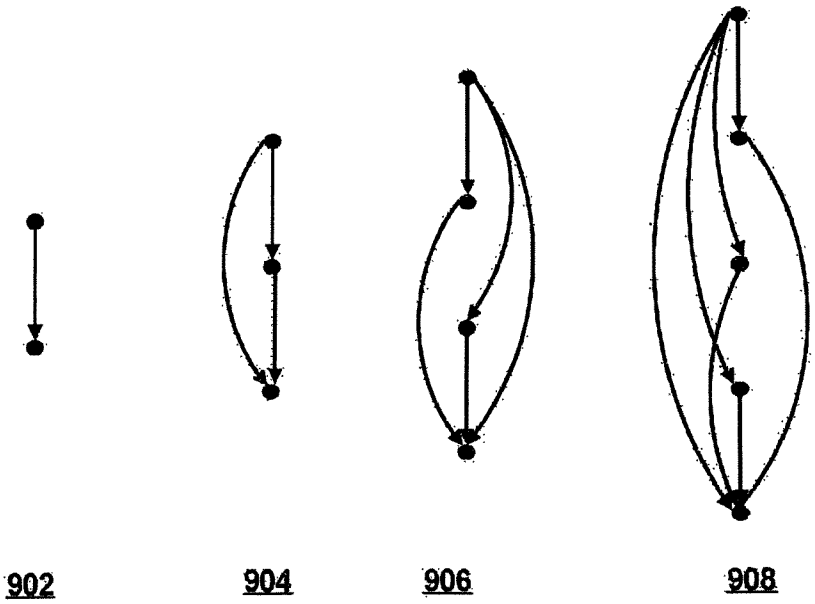

902
904
906
908

FIG. 10

	X_0	X_1	h_1	h_2	h_2	h_4
H_1	0.5432009962	0.1209278375	0	0	0	0
H_2	0.0935800473	0.7445245748	0.05151715909	0	0	0
H_3	0.7316040563	0.2613827579	0.23862388462	0.19547516981	0	0
H_4	0.6601117899	00.2639543704	0.21681510286	0.19547516981	0.9250150106	0
H_5	0.1384484131	0.14744964980	0.78773570085	0.6069568610	0.4938453605	0.1580758086

FIG. 11

0.206	-0.618	0	0	0	0
0.064	-0.192	0.035	0	0	0
0.132	-0.395	0.072	0.014	0	0
0.037	-0.11	0.02	3.946E -3	0.019	0
1	-3	0.545	0.108	0.525	0.637

FIG. 12

0.205	-0.616	0	0	0	0
0.064	-0.191	0.035	0	0	0
0.132	-0.395	0.072	0.014	0	0
0.037	-0.11	0.02	3.946E -3	0.019	0
1	-3	0.545	0.108	0.525	0.637

FIG. 13

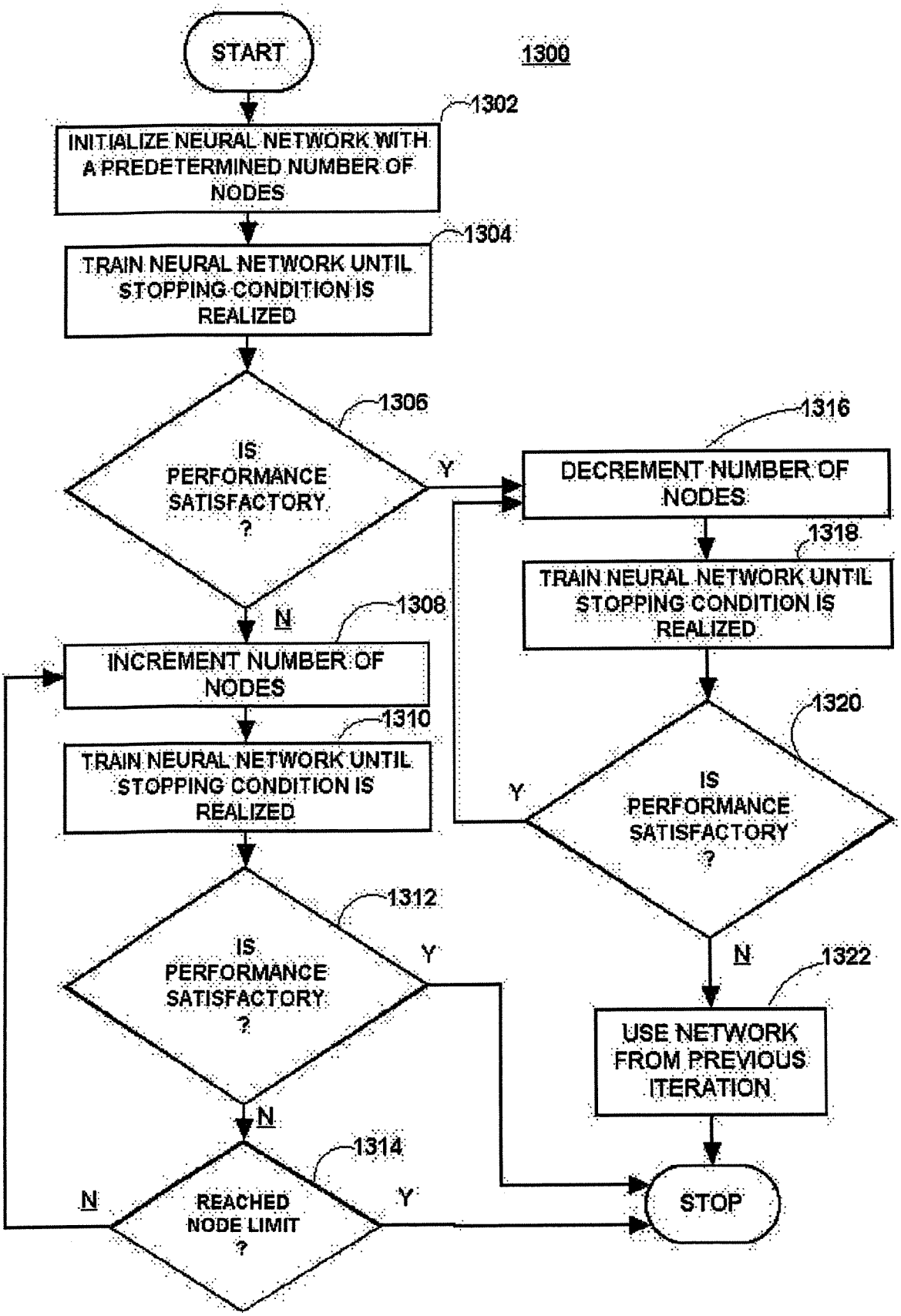
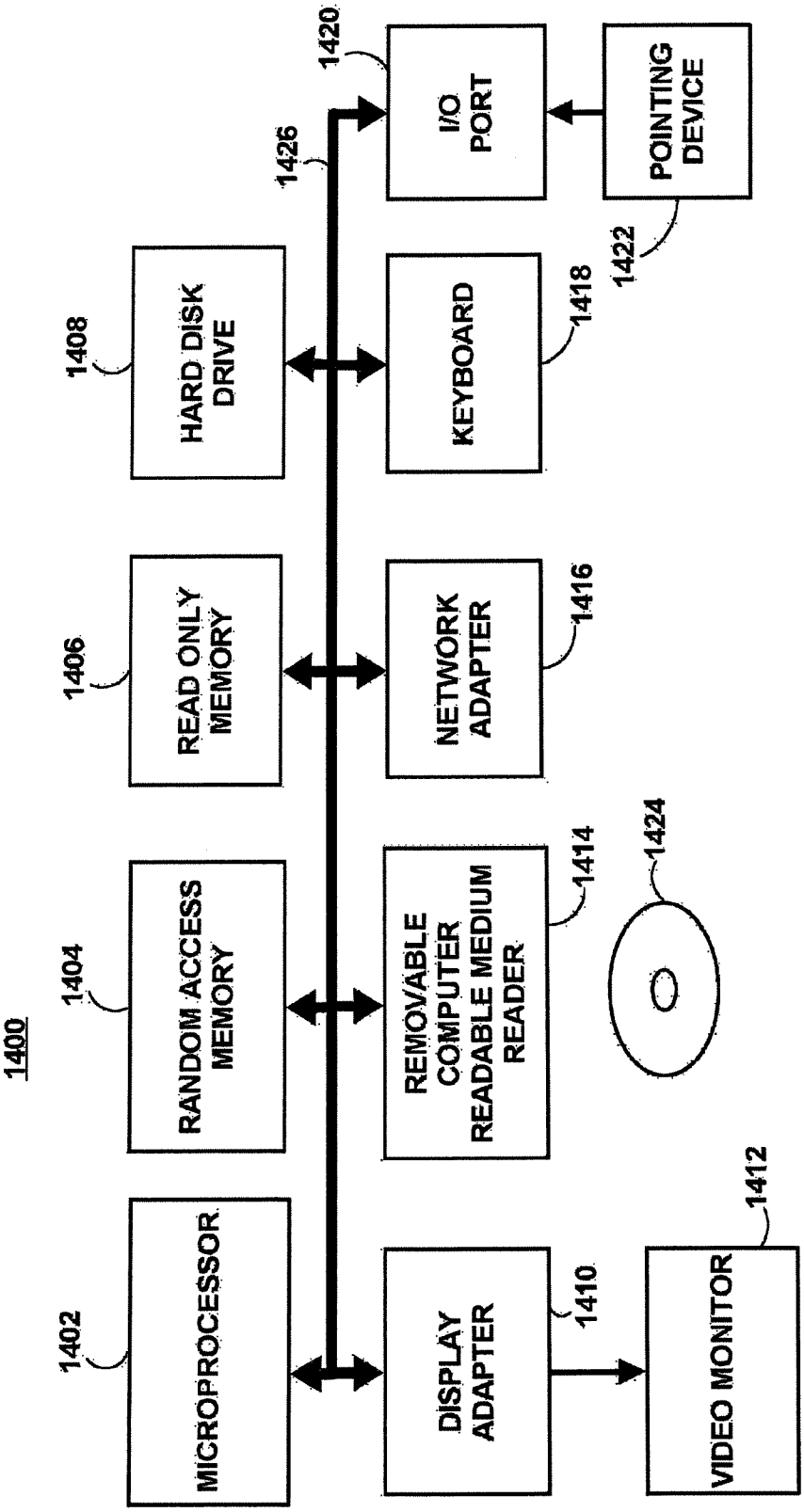

START
1300
1302
INITIALIZE NEURAL NETWORK WITH A PREDETERMINED NUMBER OF NODES
1304
TRAIN NEURAL NETWORK UNTIL STOPPING CONDITION IS REALIZED
1306
IS PERFORMANCE SATISFACTORY ?
Y
N
1308
INCREMENT NUMBER OF NODES
1310
TRAIN NEURAL NETWORK UNTIL STOPPING CONDITION IS REALIZED
1312
IS PERFORMANCE SATISFACTORY ?
Y
N
1314
REACHED NODE LIMIT ?
N
Y
1316
DECREMENT NUMBER OF NODES
1318
TRAIN NEURAL NETWORK UNTIL STOPPING CONDITION IS REALIZED
1320
IS PERFORMANCE SATISFACTORY ?
Y
N
1322
USE NETWORK FROM PREVIOUS ITERATION
STOP

FIG. 14


1400
1402
MICROPROCESSOR
1404
RANDOM ACCESS MEMORY
1406
READ ONLY MEMORY
1408
HARD DISK DRIVE
1410
DISPLAY ADAPTER
1412
VIDEO MONITOR
1414
REMOVABLE COMPUTER READABLE MEDIUM READER
1416
NETWORK ADAPTER
1418
KEYBOARD
1420
I/O PORT
1422
POINTING DEVICE
1424
1426